

# USER MANUAL FOR THE PROGRAM

## LOFT 97

Version 1.0

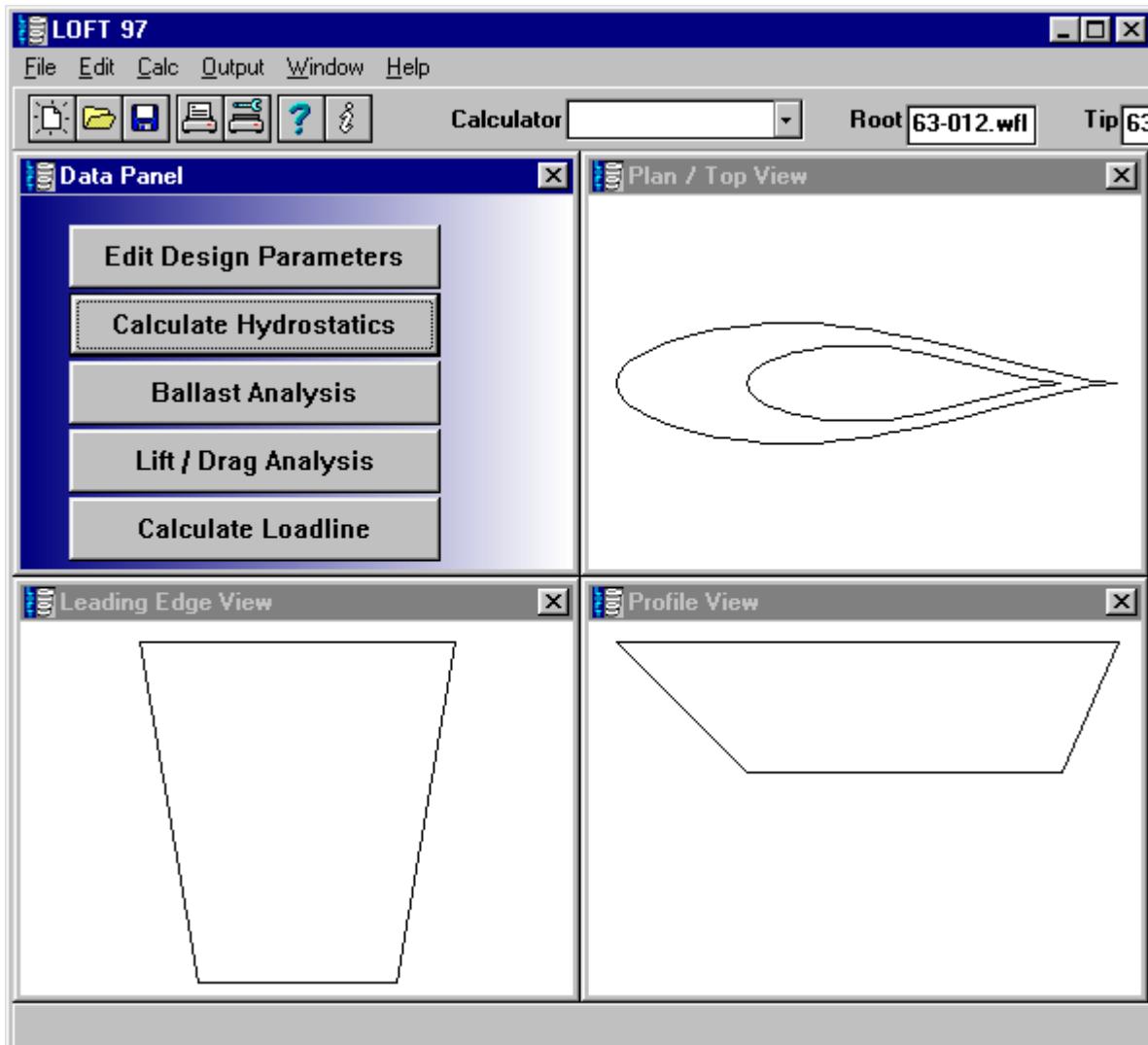
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By

VACANTI YACHT DESIGN

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## **INTRODUCTION**

This program allows the designer to LOFT keels or rudders in either metric or english units, using either Parabolic or Elliptical trailing edges. When using english (inches) units, both inches, eighths, and sixteenths as well as decimal inches are printed out. LOFT also provides extensive hydrostatics calculations, plots of aerodynamic loading, and output files for use in CAD programs such as AutoCAD, CADKEY, DesignCAD and many others. These CAD programs can be used to generate full size patterns and drawings.

LOFT automatically selects the NACA or NASA foil thickness that most closely approximates the root and tip thicknesses. This is a necessity, because NACA 60 series FOILS MAY NOT BE SCALED MORE THAN 1-3% and still yield the proper thickness distribution. This is spelled out clearly in THEORY OF WING SECTIONS.

## **INTENDED PROGRAM USAGE**

This program was written to allow the designer to make repeated changes and edits in an effort to achieve a desired ballast weight, center of gravity, wetted area or other design parameter. The program will allow unlimited changes, and even changing between foil types as well as straight and curved trailing edges. LOFT provides significant analysis tools to allow the user to rapidly evaluate lift, drag and ballast trade options.

## **INSTALLATION:**

Place the Vacanti Yacht Design LLC CD ROM in the CD drive and run AutoRun. Choose the LOFT 97 installation from the menu. The Installation program will automatically set up the program on any 32 Bit version of WINDOWS.

## **Register LOFT 97**

### PRINTER MUST BE TURNED ON.

“LOFT 97” is protected from pirating by Software Copy Protection. Each copy of LOFT 97 will be “locked” to the first computer it is run on. When LOFT 97 is installed and run for the first time the “LOFT 97 Unlocked” message window will be displayed. There are two buttons on the bottom of this form – one labeled “Close Dialog and Contact Vacanti Yacht Design”, the other button labeled “Unlock LOFT 97” is used after you have received a computer Key Word from Vacanti Yacht Design.

Press the “Close Dialog...” button the first time you run LOFT 97. A special registration form will be printed that contains a computer number that is unique to your computer. LOFT 97 will then close. Send this number along with your name and address to Vacanti Yacht Design by e-mail or fax using the information printed on the form or on the dialog box.

Vacanti Yacht Design will send back to you a computer “Key Number”. Run LOFT 97 again and enter this key number in the space provided for it on the Registration Dialog. Then press Unlock LOFT 97. SAVE the Key Number in a safe place.

The key number will be saved in a LOFT 97.ini file that must not be disturbed. If the file is erased or corrupted, the registration form will be displayed and you may re-enter the key number.

### UPGRADING COMPUTER HARDWARE

If the computer hardware that is used to run LOFT 97 is substantially changed it may fail to run and present the registration form. Should this happen, please contact Vacanti Yacht Design and describe the upgrades that have been made. If you purchase a new computer

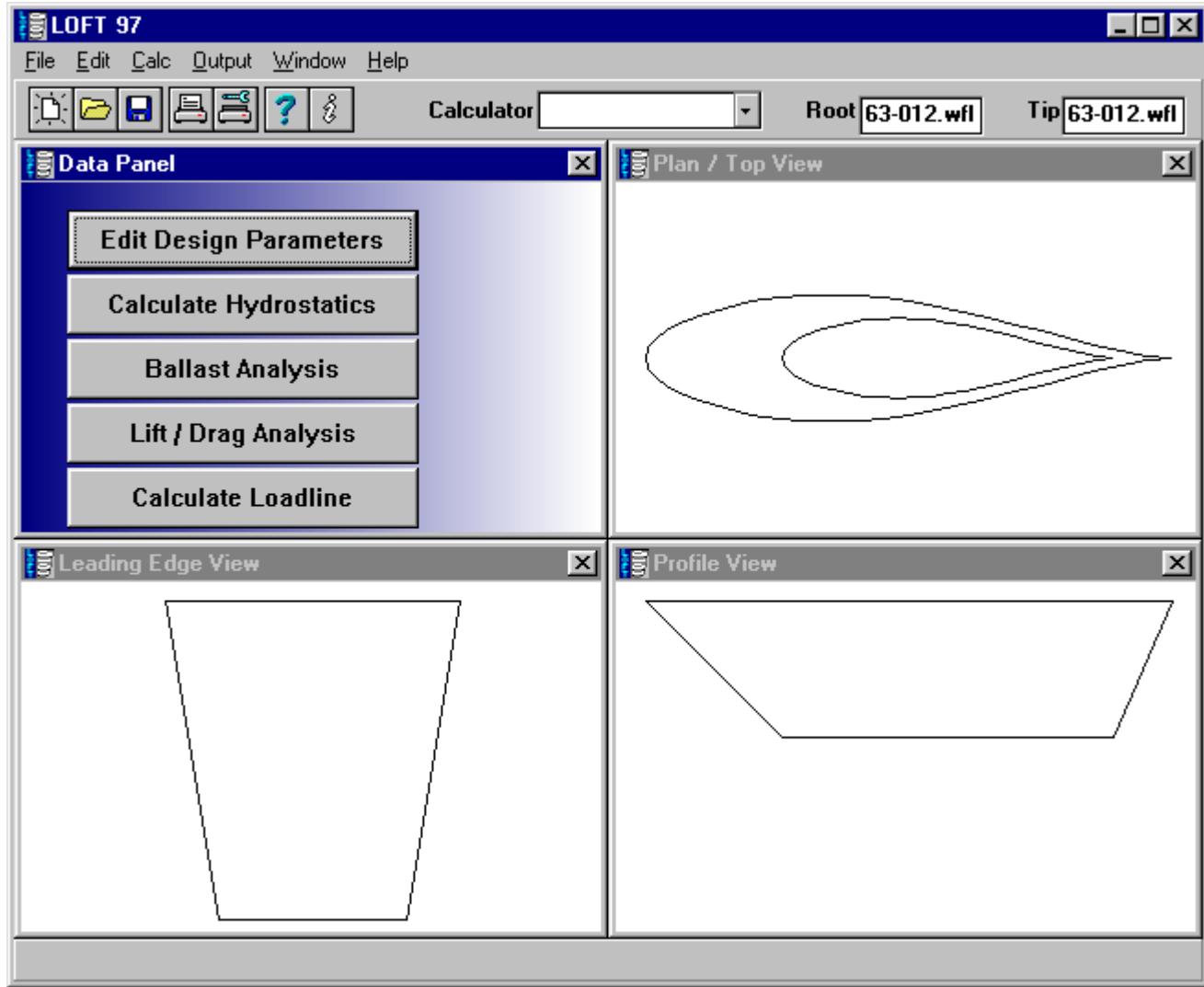
## **RUNNING LOFT**

The first screen to appear following the title screen is the main pull down menu list. You must always begin using the program by selecting: BEGIN A NEW FILE or EDIT AN OLD FILE from the FILE menu list.

## **PRINTING COPIES OF THE SCREEN**

LOFT 97 Supports all Windows Printers.

## Main Design Screen

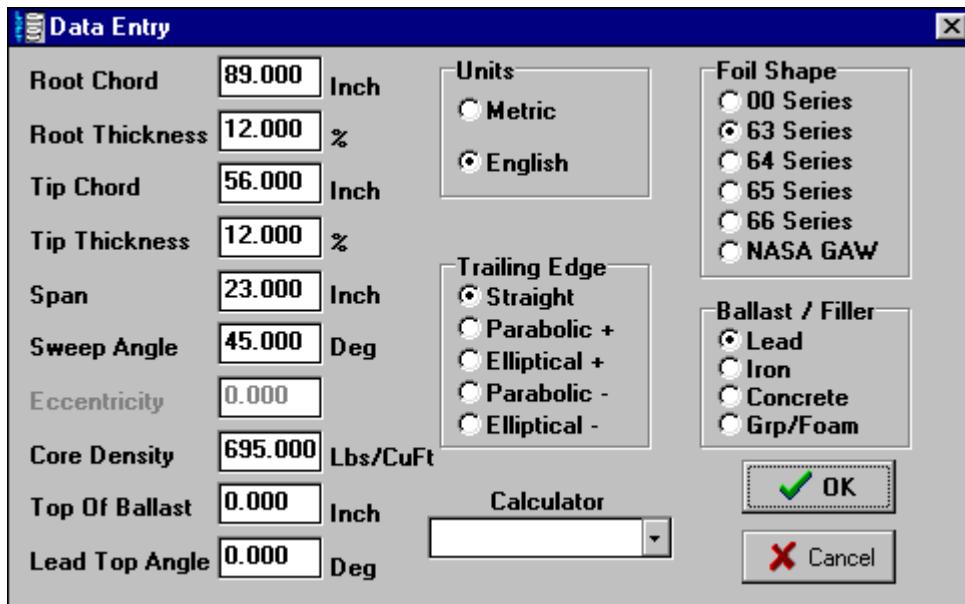


The main screen provides the ability to make design changes and perform analysis on an existing design. The three primary views are always shown of the keel under development. To make changes to the design simply select "EDIT DESIGN PARAMETERS". This will bring up the Design Parameter dialog box.

To begin a new design select **File, New**. This will create a new untitled design open the Design Parameter dialog box. To create a new design simply modify the default values found in the dialog box. When the design parameters are entered press OK and the design will be drawn in 3 views as shown above.

The top or Plan view shows the shape of the keel or rudder as viewed from above. We have drawn only the root chord (near the hull) and the tip chord (furthest from the hull) for clarity. This makes it easy to see how a bolt pattern will lie relative to the tip chord, or the degree of sweep needed to accommodate the rudder shaft.

## Editing A Design

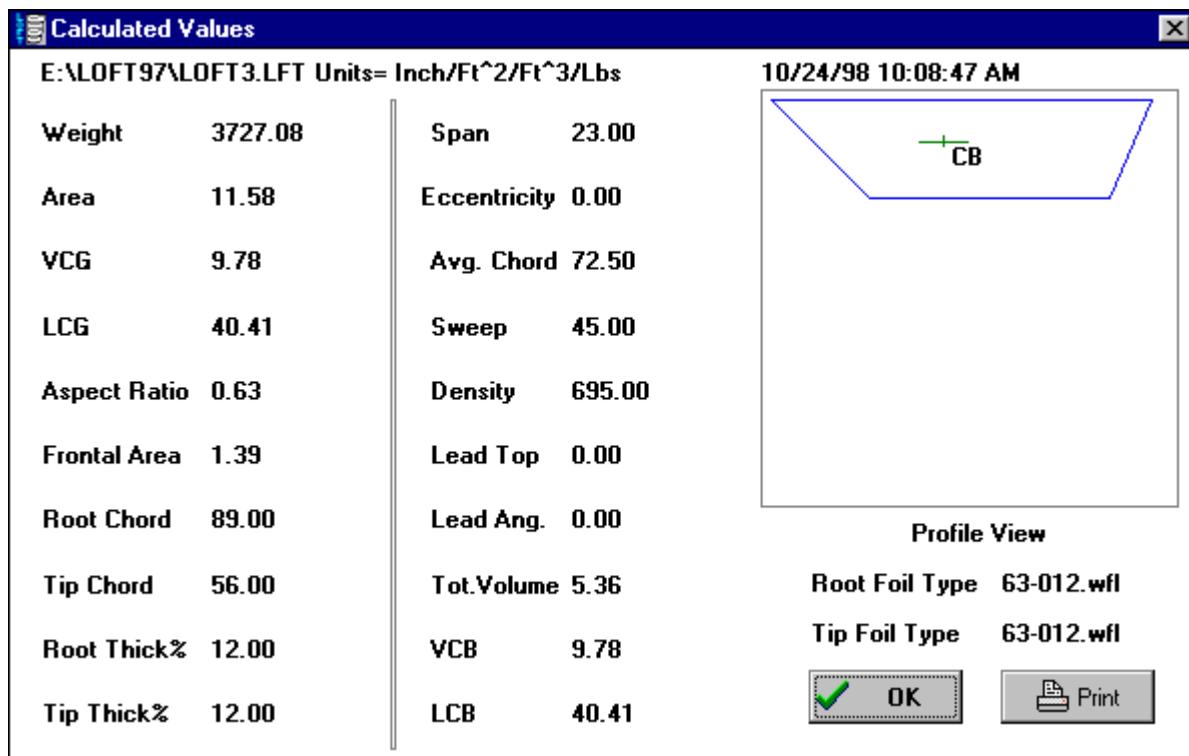


To edit or change any of the design parameters associated with your keel or rudder, press Edit Design Parameters on the main screen or select the same function from the Edit menu list.

When the Data Entry dialog box is open you may change any design value by editing the value in a data field or clicking a different check box for options such as foil type or trailing edge type.

One data field that is not obvious as to its function is the ECCENTRICITY value. This value is only active for keels or rudders with curved trailing edges. A large value of eccentricity causes the curve of the trailing edge to be arch significantly. A small eccentricity value causes a nearly straight trailing edge. Experiment with small changes in this value until you are familiar with its effects.

## HYDROSTATICS Calculations



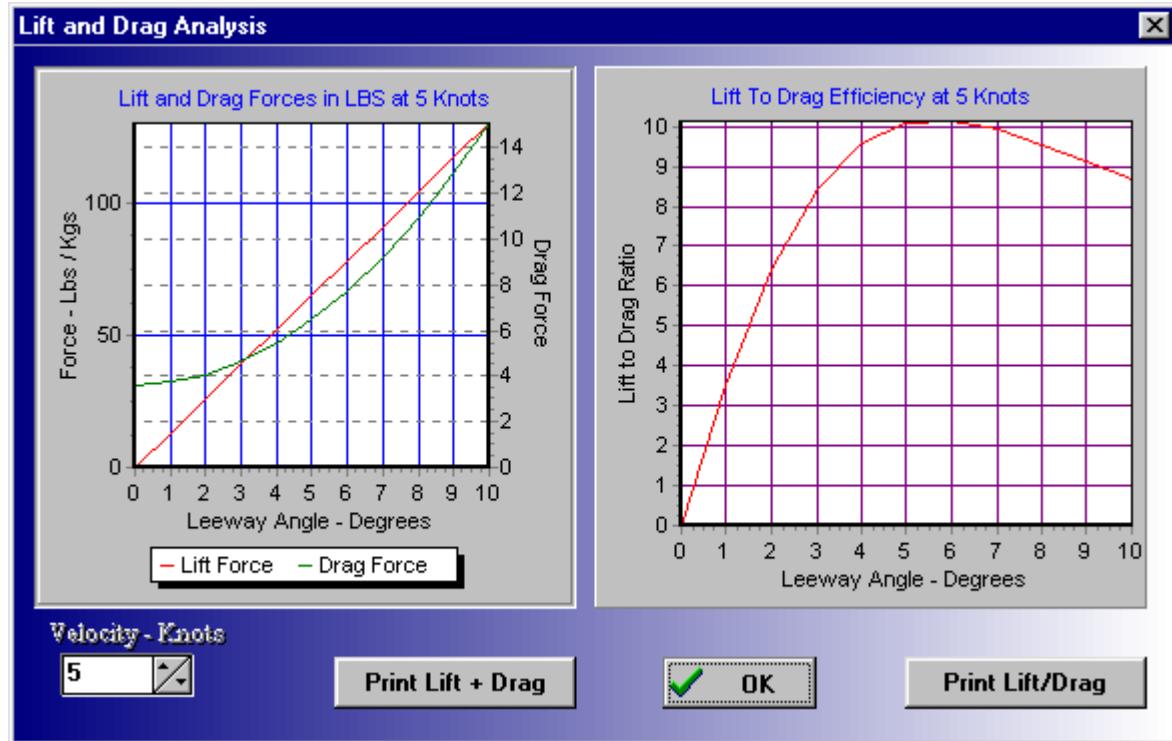
This dialog appears when the Calculate Hydrostatics button is pressed on the Main Screen.

This dialog box provides substantial information about your design. The data includes values such as Frontal Area – which is the area of the keel or rudder when viewed from the leading edge. This value should be minimized for low drag.

The dialog also shows the assumed density of any ballast or filler material that was entered on the Data Entry Dialog (See Edit Design Parameters), and the location of the LCG – Longitudinal Center of Gravity, VCG – Vertical Center of Gravity as well as counterparts LCB and VCB. The LCB and VCB – Longitudinal and Vertical Centers of Bouyancy is required to show the center of the keel or rudder volume. These values (LCB and VCB) are critical to flotation and stability issues, in particular if the keel is not filled with ballast.

Click on the PRINT button to copy the entire dialog to your printer. This will record a drawing and data for your design notes and trade studies.

## LIFT and DRAG Analysis

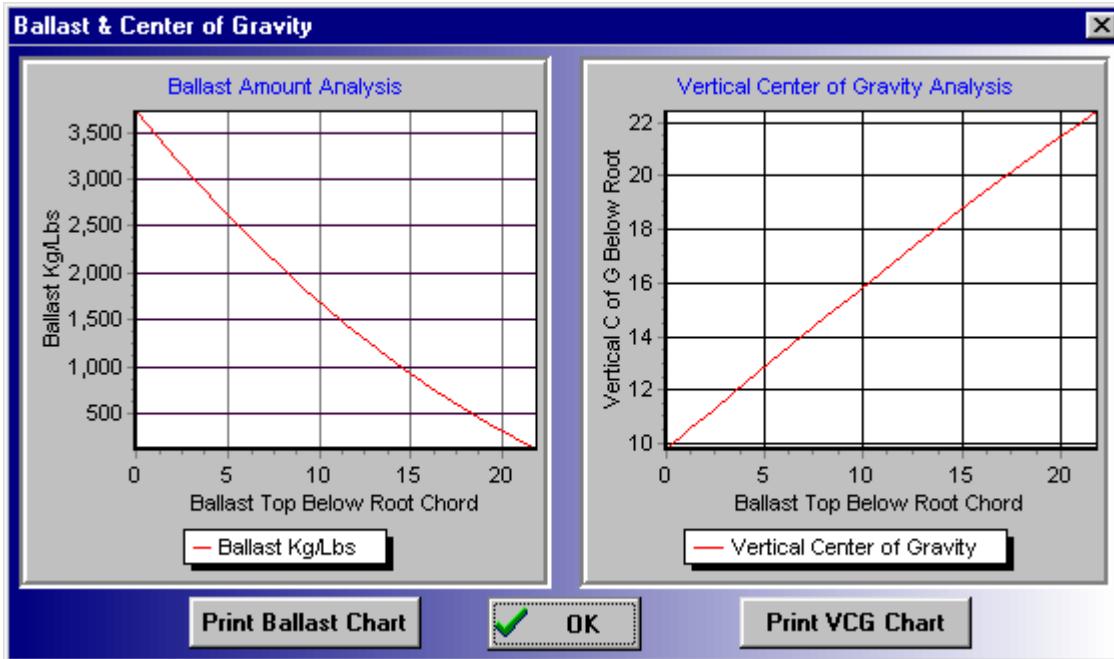


The Lift and Drag analysis features of LOFT 97 represent a significant design capability. LOFT allows the designer to predict the actual pounds or kg of force that are produced by the keel or rudder design as a function of angle of attack. Angle of attack is leeway angle for the keel and rudder steering angle for a rudder (in addition to the leeway).

The actual amount of lift or drag that is produced by the keel or rudder is dependent on the velocity of the boat. Change the velocity by clicking the up or down arrows on the Velocity – Knots button and note the changes in lift and drag forces.

The lift to drag ratio should be maximized to the greatest extent possible. Lift to drag ratio describes the overall keel efficiency.

## BALLAST ANALYSIS



The Ballast Analysis dialog is a powerful tool that eliminates many minutes of constant changes and test cases for ballast levels that do not completely fill the keel. Using these two charts it is easy to see at a glance if the desired ballast amount will produce the desired center of gravity.

### Example Chart Use:

Find the amount of ballast that will produce a center of gravity 16 inches below the keel root chord.

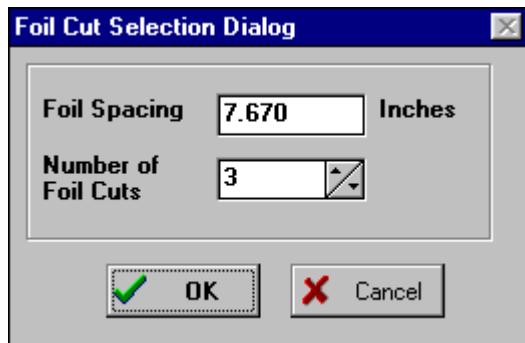
Step 1: On the VCG chart on the right locate the VCG of 16 on the vertical axis.

Step 2: Move to the right until you meet the plotted curve and descend to the horizontal axis at 10 inches.

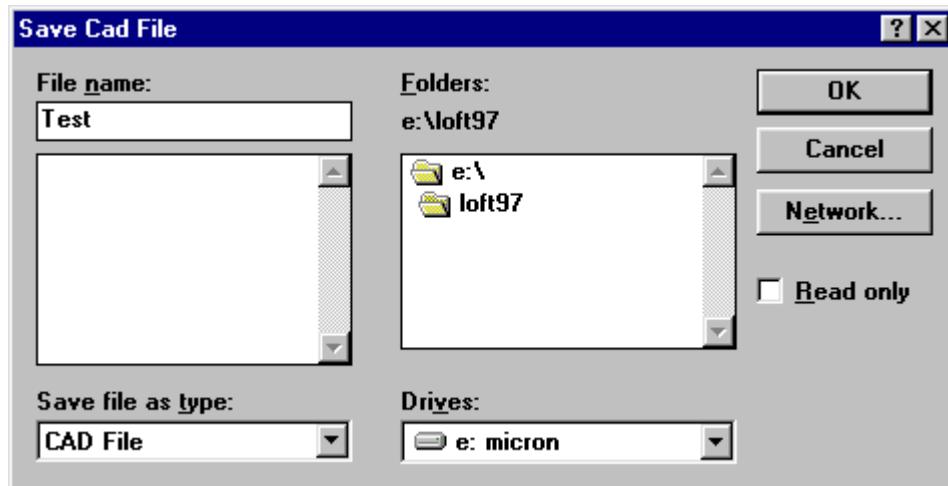
Step 3: Enter the ballast amount chart on the left at 10 inches on the horizontal axis

Step 4: Move up until you meet the plotted curve and read the ballast amount on the left axis – approximately 1700 pounds.

## CAD FILE EXPORT



LOFT provides for the export of detailed CAD files that allow the design and construction of your keel. Select the OUTPUT menu from the Main Screen. When the FOIL CUT Selection Dialog appears choose to edit either the spacings of the foil cuts (horizontal shapes across the chord length of the keel or rudder) or the number of foil cuts. Click OK and a second dialog box will appear to enter the name of your cad file.



Do not attempt to place a cad file suffix (such as .dxf) to the file name, LOFT will automatically add ".dxf" for you.

## USER FEEDBACK CARD

We want to keep in touch with our users. Please fill out this card and mail it to Vacanti Yacht Design.

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
State/County: \_\_\_\_\_ Zip Code  
or Mail Code: \_\_\_\_\_  
Country: \_\_\_\_\_  
Phone: \_\_\_\_\_

Where did you Purchase This Program? \_\_\_\_\_  
When? \_\_\_\_\_ How Much  
Did You Pay? \_\_\_\_\_ How would you rate  
the user manual? ExcellantGoodPoor How would you rate the  
program? ExcellantGoodPoor

VACANTI YACHT DESIGN  
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RENTON WA. 98058 USA

**SOFTWARE PROBLEM REPORT**

NAME: \_\_\_\_\_  
STREET: \_\_\_\_\_  
CITY: \_\_\_\_\_  
STATE/COUNTY/PROVINCE: \_\_\_\_\_  
ZIP CODE: \_\_\_\_\_  
PHONE: \_\_\_\_\_ DATE: \_\_\_\_\_

Instructions \_\_\_\_\_  
Use this form to report software bugs, documentation errors, or  
suggested enhancements. Mail this form to Vacanti Yacht Design at the  
address above.

Category \_\_\_\_\_

Software Problem  
 Software Enhancement  
 Documentation Problem  
 Other

Product Description \_\_\_\_\_

Program Name: \_\_\_\_\_  
Rev. Number: \_\_\_\_\_

Computer Used: \_\_\_\_\_ CPU Chip: \_\_\_\_\_  
Peripherals: \_\_\_\_\_  
Graphics Card/Math Coprocessor(8087/80287) \_\_\_\_\_

Problem Description:  
Please be complete as possible, giving operating conditions and  
suggested remedy if any.